State of California
Natural Resources Agency
Department of Fish and Wildlife
Wildlife Branch

Status and Distribution of the Light-footed Ridgway's (Clapper) Rail in California

2016 Season

By

Richard Zembal, Susan M. Hoffman, and John Konecny

Nongame Wildlife Program, 2016-04

Final Report

To

State of California
Department of Fish and Wildlife
South Coast Region
3883 Ruffin Road
San Diego, CA 92123

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Huntington Beach Wetlands Conservancy
24821 Buckboard Lane
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ABSTRACT

The thirty-seventh annual census of the Light-footed Ridgway's (formerly Clapper) Rail, *Rallus obsoletus levipes*, in California was conducted from 22 February to 25 June 2016. Thirty coastal wetlands were surveyed by assessing call counts from Carpinteria Marsh in Santa Barbara County, south to Tijuana Marsh National Wildlife Refuge (NWR) on the Mexican border. For the fifth year in a row the California population of the Light-footed Ridgway's Rail exceeded 500 breeding pairs and for the second time in 40 years exceeded 600 pairs. A total of 656 pairs exhibited breeding behavior in 18 marshes in 2016. This is the highest count on record, representing an increase of 23 pairs from the breeding population detected in 2015, and 47.9% larger than the long-standing high count in 2007. The tally at Upper Newport Bay was the third highest recorded there at 202 pairs. The Newport subpopulation was once again the largest in California but with 13.7% fewer rails exhibiting breeding behavior than in 2015. Nesting habitat in Upper Newport Bay has been greatly degraded over the past three years as evidenced by fruitless nest searches; the habitat in the lower bay has been badly degraded. The calling in Tijuana Marsh NWR indicated breeding readiness of 127 pairs, a 29.6% increase over 2015 but subsequent anoxic conditions caused by closure of the river mouth may have greatly affected survival and reproductive activity. The Newport subpopulation comprised 30.8% of the state population in 2016 and the subpopulation in the Tijuana Marsh National Wildlife Refuge (NWR) comprised 19.4%, together accounting for 50.2% of the breeding population of this rail in California, as compared to 52.5% in 2015, 56.2 % in 2014, and 56.4% in 2013.

Nine of the small subpopulations increased in size from the 2015 totals, by a combined total of 53 breeding pairs in 2016. In response to the development of cordgrass cover that is unsurpassed

[1] Zembal, R., S.M. Hoffman, and John Konecny. 2016. Status and Distribution of the Light-footed Ridgway's (Clapper) Rail in California, 2016. California Department of Fish and Wildlife, Wildlife Branch, Nongame Wildlife Program Report, 2016-04. Sacramento, CA 28 pp.

in the range of this rail, the San Elijo Lagoon subpopulation doubled to 60 pairs in 2015 and added at least 10 more pairs in 2016 to become the third largest subpopulation in California. The Seal Beach NWR subpopulation was down by six to 60 pairs, ranking it the fourth largest in the state. Batiquitos Lagoon was up to a high of 52 breeding pairs, ranking it as the fifth largest subpopulation in 2016. The University of California's Kendall-Frost Reserve nearly maintained its record high with 30 breeding pairs in 2016, a testament to strong management of this small Mission Bay remnant marsh. Nesting activity in Point Mugu was back up to 2014 levels with 16 pairs, after increasing steadily to a record high of 23 pairs in 2013 but dropping to 12 pairs in 2015. Declines totaling 26 pairs were noted in seven marshes including Seal Beach NWR (-8 pairs), Buena Vista Lagoon (-6 pairs), Agua Hedionda Lagoon (-4 pairs), and San Luis Rey River (-3 pairs). Excluding the two largest subpopulations, there were nine subpopulations in double figures, ranging from 16 to 70 pairs and totaling 296 breeding pairs or 45.1% of the state total. The remaining seven small subpopulations ranged from one to nine pairs and totaled 31 breeding pairs, or 4.7% of the total.

The annual increases in the population total of the Light-footed Ridgway's Rail between 2002 and 2007 gave encouragement that restoration and management including breeding in zoological facilities were contributing to the recovery of this endangered bird. The 2008 crash was presumably weather-related and a harbinger of what could be in store if wide weather fluctuations are the future norm. Record high counts of over 500 pairs in 2012 through 2014, and over 600 pairs in 2015 and 2016 is a manifestation of this subspecies' resiliency with consistent management.

INTRODUCTION

The Light-footed Clapper Rail (*Rallus longirostris levipes*) is a state- and federally- listed endangered species and state fully protected species that is resident in coastal wetlands in southern California and northern Baja, California, Mexico. This rail along with both of the other large rails of the western U.S. has been reclassified taxonomically and renamed by the American Ornithologist Union and ascribed to the Ridgway's Rail, *Rallus obsoletus* (Chesser et al. 2014). The common name for our southern California subspecies soon should be legally adopted by the wildlife agencies in recognition of this nomenclatural change. The Light-footed Clapper Rail will then be called the Light-footed Ridgway's Rail, *R. obsoletus levipes* (hereafter LFRR).

Loss and degradation of habitat threaten the continued existence of this bird, although recent management efforts are reversing those trends. The California population of this endangered rail was at a former high of 325 pairs in 15 marshes in 1996, the largest number detected breeding since statewide annual surveys were begun in 1980, until 2004 when 350 pairs were detected in 15 marshes. Since then, there were annual increases until the record high in 2007, when 443 breeding pairs were detected in 19 marshes. There was a population crash in 2008 followed by recovery of 37% in 2009 to 320 breeding pairs, and annual increases since then through 2015 when a new high total of 633 pairs was reached.

One of the first major investigations of this rail identified the lack of suitable nesting habitat as a major, widespread limiting factor (Massey and Zembal 1980). Subsequent work demonstrated the need for emergency actions and recommended management strategies to stem the alarming population decline of this endangered bird in southern California. The actions taken have included: 1) habitat restoration, particularly through enhancement of tidal action to former wetlands; 2) study and control of introduced predators and unnaturally high predator populations; 3) provision of nesting sites in marshes with good habitat but limited options for protected nesting locations; 4) studies that have led to adaptive management strategies, benefiting the rail and the other co-inhabitants of these biologically-rich ecosystems; 5) development of a protocol for captive breeding and genetic and demographic augmentation of smaller subpopulations; and 6) surveys of the California population, in part to track the effects of management on annual recruitment.

Implementation of these measures has succeeded in protecting and maintaining the small subpopulations and in supporting the expansion of many of them, particularly because of the release of captive bred rails. However, the benefits of the associated habitat restoration and management go far beyond this single species. These endangered birds thrive in our most productive, remaining coastal wetlands. Measures that benefit this rail and its environs enhance conditions for a myriad of other species as well, including people. These places and the wildlife are cherished by hundreds of thousands of southern Californians for their inherent aesthetic, recreational, economic, scientific, educational, and ecological values. Furthermore, there are essential links between the coastal wetlands and vast acres of diverse upland habitats and wildlife located many miles from the coast (Soule et al. 1988, Zembal 1993). Restoring and maintaining the diversity and vital productivity of the coastal wetlands, while achieving the recovery of the LFRR, may only be possible in an environment that includes coastal southern California's complete wildlife heritage, fostered by a caring public who support the management necessary to maintain the interconnectedness and viability of the system.

Hundreds of wetland acres have undergone, or are being planned for restoration. However, full recovery and functionality of a coastal wetland may take decades to achieve. In the meantime, habitat suitability for the rail may be quite marginal. All but a few of the current subpopulations of LFRR depend upon a marginal habitat base and are too small to be expected to maintain themselves without management, particularly population augmentation.

Population monitoring is essential in understanding the effects of our management efforts and in stewardship of this critically endangered bird toward recovery. Reported herein are the results of the 2016 statewide survey of the LFRR.

METHODS

The thirty-seventh consecutive annual census of LFRR in California was conducted from February 22 through June 25, 2016. Thirty coastal wetlands were surveyed by mapping territorial pairs based on their calls (Zembal and Massey 1981, 1985; Zembal 1992). All of the coastal marshes with known or suspected rail subpopulations were surveyed until an evening or early

morning with good calling activity was encountered. Small wetlands with no recent rail sightings that again yielded negative results were surveyed at least twice as were marsh parcels with lower than expected results on the first call count. Additionally, nesting data were considered in the assessment of the subpopulations inhabiting the four wetlands wherein such data were gathered in 2016 (Mugu, Seal Beach, Kendall-Frost, and Sweetwater) and a pre-nesting high tide count was accomplished on November 25, 2015 on the Seal Beach NWR; a post-nesting high tide count will be scheduled for fall/early winter 2016. This NWR is the only wetland inhabited by LFRRs that is currently inundated enough during a 6.7 ft. tide or higher to get a relatively complete visual survey.

In Upper Newport Bay and Tijuana Marsh, mapping spontaneous calls was the prevalent technique. In marshes with fewer rails and along long, narrow strips of habitat, playbacks of taped "dueting" were used sparingly to elicit responses. In the Tijuana Marsh NWR, enough observers were stationed within potential hearing range of any calling rail to cover the entire marsh on a single evening. However, most of the marshes were surveyed by a single observer visiting discrete patches of habitat on consecutive evenings until all available habitat had been covered. Most of the observations were those of three observers (the co-authors), but primarily the principal investigator. Additional observers participated primarily in three of the year 2016 counts, those at Seal Beach NWR, Tijuana Slough NWR, and Kendall-Frost Reserve.

The more movement required of an observer during a survey, the more likely that breeding, but infrequently-calling rails would be missed. Calling frequency and the detection of calls are influenced by the observer's hearing ability and experience with the calls, the stage of breeding of individual pairs, rail density, and weather conditions (Zembal and Massey 1987). Many surveys attempted on stormy, windy days needed to be repeated. When calling frequency is high with many rounds of calling as adjacent pairs respond to one another, it is possible to map the rails accurately and move on to survey more marsh. However, under usual circumstances approximately 20 ha (50 acres) of marsh can be adequately covered during a single survey.

Surveys are usually conducted in the 2 hrs before dark, but some are done from first light to about 2 hrs after sunrise. In the past, early morning and late evening surveys have been comparable, although evening calling by the rails is more intense and often ends with one or more flurries of intense calling (Zembal et al. 1989).

The playback of a taped "clappering" call appears to be responded to by the rails as if a living pair is calling nearby. However, work done with Yuma Ridgway's Rails (*Rallus obsoletus yumanensis*) strongly suggests that this closely-related species can become conditioned to the tape if it is used excessively (B. Eddleman, pers. comm., July 1993). During prime calling times in the evening or early morning, a playback sometimes elicits a single response or a round of calling. However, there are sometimes no vocal responses to the tape. If played at a time of day when the rails are not particularly prone to call, the only response likely to be elicited is that of the territorial pair intruded upon. Sometimes the response is non-vocal investigation by the pair or one member. Repeated playbacks are likely to elicit aggression. When used only once per year at a given marsh and with minimal repetition, playbacks have yielded important results.

Unmated LFRR, for example, often respond at considerable distances and may approach the tape. Isolated single rails often approach very closely and remain in the vicinity unless displaced.

In assessing the rail population, duets and some single "clapperings" were treated as territories. Since advertising singles are not indicative of an occupied territory with reproductive potential at the time of the survey, they are not included in the population total. However, a single "clappering" is as good an indicator of a territory as a duet, when advertising is not heard later from the same territory. Eventually, during a 2 – 4 hr census period, pairs often dueted from territories where only single pair members had called earlier. However, the fewer rails in a marsh, the more important it is to count only duets as pairs to avoid over-estimating the breeding subpopulation. The 2016 call counts were conducted on 40 dates and totaled approximately 414 field-hours, mostly from February 22 – June 25, 2016.

Study Areas

Descriptions of all the marshes recently occupied by LFRR are available (U.S. Fish and Wildlife Service 1985 and Zembal and Massey 1981). Four of the current principal study areas are at the Naval Air Station Point Mugu (NASPM, also Point Mugu), the Seal Beach NWR, Upper Newport Bay Ecological Reserve, and Tijuana Slough NWR.

The marsh at Point Mugu is located in southeastern Ventura County on the 1,821 ha (4,500 acre) Naval Base Ventura County (NBVC), about 13 km (8 miles) west of the Los Angeles County line. There are 1,012 ha (2,500 acres) of jurisdictional wetlands in Point Mugu (USACOE/EPA 1994), including the largest functioning salt marsh in coastal southern California today. Considering the combined acreages of marshes that are regularly occupied, the vegetated marsh and most closely associated habitats at Mugu Lagoon represent more than 25% of the LFRR potential habitat base. The marsh is subject to nearly full tidal action in the central and eastern arms with a tidal amplitude of about 9 ft. The tides are dampened by constrictions at Laguna Road and farther west, resulting in an amplitude of only 4 - 5 ft. The wetland vegetation is dominated by pickleweed (*Salicornia virginica*) but scattered stands of spiny rush (*Juncus acutus* ssp. *leopoldii*) are critical for rail nest placement.

The Seal Beach NWR covers 369 ha (911 acres) of the 2,024 ha (5,000 acre) Seal Beach Naval Weapons Station in Orange County near the City of Seal Beach. About 299 ha (739 acres) of the refuge lands are subject to regular inundation by the tides. There are about 229 ha (565 acres) of salt marsh vegetation, 24 ha (60 acres) of mudflats that are exposed daily, and 46 ha (114 acres) of channel and open water. The wetlands are fully tidal, with a range of about - 0.5 m (1.7 ft) to + 2.2 m (7.2 ft) MLLW, and very productive with a high diversity and abundance of wildlife.

Upper Newport Bay is an Ecological Reserve of the California Department of Fish and Wildlife (CDFW), located approximately 22 km (13.7 mi) down coast of the Seal Beach NWR. Approximately 304 ha (750 acres) are fully tidal, including 105 ha (260 acres) of marsh. The bay is bordered by bluffs, 9 - 18 m (30 - 59 ft) high, and surrounded by houses and roads. There are approximately 100 ha (247 acres) of shrublands remaining undeveloped on the edge of the

wetlands and two local drainages, with some cover along them coursing into the bay.

Tijuana Slough NWR consists of 427 ha (1,056 acres) of open water, tidal salt marsh, beach dune, riparian, and maritime scrub habitats in the City of Imperial Beach in the extreme southwest corner of the U.S. The NWR is part of the 1,024 ha (2,530 acre) Tijuana River National Estuarine Research Reserve (NERR), one of only 26 such NERRs in the country. The fully tidal coastal salt marsh (influenced by a 7 ft tide MLLW) comprises 159 ha (392 ac) of the total area along with 41 ha (101 ac) of tidal creeks and mudflat. Tijuana Slough is the only coastal wetland in the southern California Bight that is not bisected or greatly impacted by a major paved road or the coast railroad.

RESULTS and DISCUSSION

A total 656 pairs of LFRR exhibited breeding behavior in 18 marshes in 2016 (Table 1). This is the highest count on record, representing a 23 pair increase over the breeding population detected in 2015 (Zembal et al. 2015), and 47.9% larger than the former high count of 2007 that stood as the high for 31 years until 2012. Upper Newport Bay with 202 pairs was once again the largest subpopulation in California although reduced by 20 – 30 pairs from two consecutive years of record high counts, still with 16% more rails than the long standing former high count of 174 pairs in 2005.

For the sixth time on record there were more than 100 pairs calling in the Tijuana Marsh NWR and this subpopulation was at its second highest level. The 2016 count was a 29.6% increase over 2015 and only 10.6% lower than the record high of 142 pairs in 2007. The Newport subpopulation comprised 30.8% of the state population in 2015 and the subpopulation in the Tijuana Marsh comprised 19.4%, together accounting for 50.2% of the breeding population of this rail in California. In addition, nine subpopulations ranged in size from 16 to 70 pairs, totaling 296 breeding pairs or 45.1% of the state total. These nine included: Mugu Lagoon; Seal Beach NWR; Huntington Beach Wetlands; Batiquitos Lagoon; San Elijo Lagoon; San Dieguito Lagoon; Los Penasquitos Lagoon; Kendall-Frost Reserve; and the San Diego River. The smaller 7 subpopulations ranged from 1 to 9 pairs and totaled 31 breeding pairs (4.7% of the state total).

Breeding subpopulations in 2016 were male-skewed in 9 marshes and female-skewed in three marshes. Brief female advertising in a marsh where male calling is consistent will usually result in an additional pair. A minimum of 85 unmated males and five females were heard during the call counts including: a female in Ballona; 20 single males at Seal Beach; two males in Huntington Beach Wetlands; 13 males in Upper Newport; one male in San Joaquin Reserve; three males in Buena Vista Lagoon; two males in San Elijo Lagoon; 21 males in San Dieguito River Valley; two females in Los Penasquitos Lagoon; three males in Kendall-Frost; two females in the San Diego River; and 20 males in Tijuana Marsh. The usual condition has been a slight male bias during most years in most marshes. An extreme male skew or a slight female skew could indicate major issues, possibly due to heavy depredation.

Table 1. Census of the Light-footed Ridgway's Rail in California, 1980-2016.

Part I: 1980 – 1989

Location	Number of Pairs Detected In:									
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Santa Barbara County										
Goleta Slough	0	0	-	0	-	-	-	-	0	0
Carpinteria Marsh	16	14	20	18	26	7	4	5#	2#	0
Ventura County										
Ventura River Mouth	-	-	0	0	-	-	-	-	-	0
Santa Clara River Mouth	-	-	0	-	-	-	-	-	-	0
Mugu Lagoon	-	0	-	1	3	7	6	7#	7#	5
Los Angeles County										
Whittier Narrows Marsh	-	-	-	*	0	-	-	-	-	0
Orange County										
Seal Beach NWR	30	19	28	20	24	11	5	7	14	6#
Bolsa Chica	0	0	0	0	-	-	-	*	0	0*
Huntington Beach Wetlands	-	0	-	-	-	-	0	0	0	0
Upper Newport Bay	98	66	103	112	112	87	99	119	116	116
San Joaquin Reserve	-	-	5	4	1	2	1	0	0	0
Carlson Rd Marsh	-	-	5	4	2	0	0	1#	0	0
San Diego County										
San Mateo Creek Mouth	-	-	0	0	-	-	0	-	0	0
Las Pulgas Canyon Mouth	-	-	0	0	0	-	-	-	-	0
Las Flores Marsh	-	-	0	0	0	-	0	-	0	0
French Canyon Mouth	-	-	-	0	0	-	-	-	-	0
Cocklebur Canyon Mouth	-	-	1	0	0	-	-	0	0	0
Santa Margarita Lagoon	0	0	2	1	2	1	1	1	1	0
San Luis Rey River Mouth	-	-	0	0	-	-	0	0	0	0
Guajome Lake Marsh	-	-	0	1	2	0	0	0	0	0
Buena Vista Lagoon	0	0	0	*	0	-	-	-	0	0
Agua Hedionda Lagoon	1	2	1	7	6	1	0	0	0	0
Batiquitos Lagoon	0	0	0	0	0	-	-	-	-	0
San Elijo Lagoon	-	5a	4	4	10	1	0	2	5#	7#
San Dieguito Lagoon	-	-	-	-	-	-	-	*	0	0
Los Penasquitos Lagoon	-	0	-	0	0	-	0	-	1a#	0
Kendall-Frost Reserve	18	16	6	20	24	17	12	6a#	4a#	4#
San Diego River	-	3	1	2	2	1	0	0	1a#	0#
Paradise Creek Marsh	1	2	3	1	1	0	0	0	0	0
Sweetwater Marsh	4	5	7	6	14	3	9	5a#	5	5#
E Street Marsh	3	1	3	3	2	2	2	0a	1#	0
F Street Marsh	-	1	1	0	1	0	0	0	0	0
J Street Marsh	-	1	0	0	-	-	0	0	0	0
Otay River Mouth	3	4	5	3	5	1	1	0	0	0
South Bay Marine Reserve	3	3	1	1	2	1	1a	2#	5	5#
Dairymart Ponds	-	-	-	-	-	-	0	*	1a	0#
Tijuana Marsh NWR	26	31	25	41	38	0	2	23a#	14a#	15a#
Total: pairs	203	173	221	249	277	142	143	178	177	163
marshes	11	15	18	18	19	14	12	11	14	8

Table 1. Census of the Light-footed Ridgway's Rail in California, 1980-2016. (continued) Part II: 1990 – 1999

Location	Number of Pairs Detected In:									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Santa Barbara County										
Goleta Slough	0	0	0	0	-	-	0	0	-	-
Carpinteria Marsh	0	0	0	0#	0	2#	3#	5#	3#	2#
Ventura County										
Ventura River Mouth	0	0	0	0	0	0	0	-	0	-
Santa Clara River Mouth	0	0	0	0	0	0	0	-	0	-
Mugu Lagoon	6#	4#	5#	5	6#	5#	3#	4#	4#	4#
Los Angeles County										
Whittier Narrows Marsh	-	-	-	0	0	-	0	0	-	-
Orange County										
Seal Beach NWR	16	28	36	65	66	51#	52#	37#	16#	15#
Bolsa Chica	0#	0*	0#	0#	0*	0*	0*	0*	0*	0
Huntington Beach Wetlands	0	0	0	0	0	0	0	0	0	-
Upper Newport Bay	131	128	136	142	129	117	158	149#	105#	104#
San Joaquin Reserve	0	0	0#	0	0	0	0	0	-	0
Carlson Rd Marsh	0	0	0	0	0	0	0	0	-	0#?
San Diego County										
San Mateo Creek Mouth	0	0	0	0	0	0	0	-	-	-
Las Flores Marsh	0	0	0	0	0	0	0	-	-	-
Cocklebur Canyon Mouth	0	0	0	0	0	0	0	0	0	0
Santa Margarita Lagoon	0	0	0	0#	0	0	0	0#	0	0
San Luis Rey River Mouth	0#	0	1	0	-	0	0	0	0	0
Guajome Lake Marsh	0	0	0	0	-	0	0	0	-	-
Buena Vista Lagoon	0a#	2#	5	2#	3#	1#	6#	7#	4	5#
Agua Hedionda Lagoon	0	0	0	0	0	0	0	1?	1	0
Batiquitos Lagoon	0#	0#	0	1#	1#	0#	2	2	1	3
San Elijo Lagoon	5#	5	4#	6#	1#	3#	3#	8	3#	5#
San Dieguito Lagoon	0	0	0	0	0	0	0	0	0	-
Los Penasquitos Lagoon	0	0#	0#	0#	1	1	1	2	2#	2
Kendall-Frost Reserve	5#	9	11	5#	5#	4#	1#	2	2	4#
San Diego River	2	5	1a	5	5#	6b	5	5#	4	3
Paradise Creek Marsh	0	0	1a	0a	0	1	2	0	0	0
Sweetwater Marsh	2#	4a	4a	3a	7#	7	8	3#	4	3
E Street Marsh	0	1a	1a	1	0#	2	1	1	1	2
F Street Marsh	0	0	0	0	0	0	0	0	1	0
J Street Marsh	0	0	0	0	0	0	0	0	0	0
Otay River Mouth	0	0	0	0	0	1	3	3	2	1
South Bay Marine Reserve	5	2	3a	1	0	0	0	1#	1	0
Dairymart Ponds	0a#	0#?	0#	1a	0	-	-	-	-	-
Tijuana Marsh NWR	17a#	47a	67a	63a	64	61	77	77#	68#	80#
Total: pairs	189	235	275	300	288	262	325	307	222	233
marshes	9	11	13	13	11	14	15	16	17	14

Table 1. Census of the Light-footed Ridgway's Rail in California, 1980 – 2016. (continued) Part III: 2000 – 2010.

Location	Number of Pairs Detected In:										
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Santa Barbara County											
Goleta Slough	-	0	0	0	-	-	-	-	0	0	0
Carpinteria Marsh	1#	1#	2	0#	0#	0	0	0	0	0	0
Ventura County											
Ventura River Mouth	-	-	0	0	-	-	-	-	0	-	-
Santa Clara River Mouth	-	-	0	0	-	-	-	-	0	-	-
Mugu Lagoon	7#	7#	10#	14#	19#	14#	17#	15#	5#	9#	12#
Los Angeles County											
Whittier Narrows Marsh	-	-	0	-	-	-	-	0	-	0	0
Orange County											
Seal Beach NWR	10#	11#	24#	23#	16#	15#	21#	24#	17#	19#	25
Bolsa Chica	0	0	0*	0	0	0	*	*	*	*	1
Huntington Beach Wetlands	-	0	0	0	0	0	4#	4	1#	5#	6#
Upper Newport Bay	150#	124#	129#	144#	165#	174#	158#	165#	88#	148#	131#
San Joaquin Reserve	0	0	0	0	-	0	0	0	*	0	#
Carlson Rd Marsh	0#	0	0	0	-	0	0	0	0	0	0
San Diego County											
San Mateo Creek Mouth	0	0	0	0	0	-	-	-	0	-	-
Las Flores Marsh	0	0	0	0	0	-	-	-	0	-	-
Cocklebur Canyon Mouth	0	0	0	0	0	-	-	-	0	-	-
Santa Margarita Lagoon	0	0	1	2	1	2	1	1	1#	-	-
San Luis Rey River Mouth	0	0	0	0	0	0	0	0	0	0	2#
Guajome Lake Marsh	0	-	-	0	-	-	0	0	0	-	-
Buena Vista Lagoon	5#	3#	6#	5#	5#	6#	8#	8#	9#	9#	6
Agua Hedionda Lagoon	2	2	1	4	5	4#	7#	4	7	6	2#
Batiquitos Lagoon	2#	3#	3#	5	11	16#	19#	22	22	26#	36#
San Elijo Lagoon	1#	1#	2	7#	7#	6#	15#	12#	5#	8	15#
San Dieguito Lagoon	0#	0#	0	0#	6	12#	31#	15#	21#	12#	28#
Los Penasquitos Lagoon	1	1	2	1#	2#	2	7#	12#	2#	4#	9#
Kendall-Frost Reserve	4	4	5#	6#	14	14	5#	4#	2#	7	10#
San Diego River	3#	4	6	6#	8#	5	4	6	4#	3	7#
Paradise Creek Marsh	0	0	0	0	0	0	0	0	0	-	0
Sweetwater Marsh	2	3#	3#	1#	3#	1	4#	4#	3	5	6#
E Street Marsh	2	0	1	1	0	0	2	1	0	0	2
F Street Marsh	0	0	0	0	0	0	0	0	0	0	0
J Street Marsh	1	0	0	1	0	0	0	0	0	0	0
Otay River Mouth	1	1	1	0	0	1	2	1	0	1	1
South Bay Marine Reserve	0	0	0	0	0	0	1	2	0	1	1
Dairymart Ponds	-	-	-	2	1	1	0	1	-	0	0
Tijuana Marsh NWR	61#	52#	78#	64#	87	87#	102#	142#	47#	57#	76#
Total: pairs	253	217	274	286	350	360	408	443	234	320	376
marshes	16	14	16	16	15	16	18	19	15	16	19

Table 1. Census of the Light-footed Ridgway's Rail in California, 1980 – 2016. (continued) Part IV: 2011 – 2016.

Location	Number of Pairs Detected In: 2011	2012	2013	2014	2015	2016	
Santa Barbara County							
Goleta Slough	-	0	0	0	0	0	
Carpinteria Marsh	0	0	0	0	0	0	
Ventura County							
Ventura River Mouth	-	0	0	0	0	0	
Santa Clara River Mouth	-	0	0	0	0	0	
Mugu Lagoon	16#	22#	23	16	12	16	
Los Angeles County							
Ballona Wetlands	-	-	-	-	-	#	1KB
Orange County							
Seal Beach NWR	34#	42#	40	49	66	60	20K
Bolsa Chica	*	*	1	2	7	9	
Huntington Beach Wetlands	6#	6	7	9	12	12	2K
Upper Newport Bay	137#	165#	191	222	234	202	13K
San Joaquin Reserve	2#	1#	2	1	1	#	1K
Carlson Rd Marsh	0	0	0	0	0	0	
San Diego County							
San Onofre Creek Mouth	0	-	1	-	0	-	
Las Flores Marsh	0	-	0	-	0	-	
Cocklebur Canyon Mouth	0	-	0	-	0	-	
Santa Margarita Lagoon	2	0	0	-	3	-	
San Luis Rey River	3	3	4	5	3	0	
Guajome Lake Marsh	-	-	-	-	0	0	
Buena Vista Lagoon	3#	9#	2	4	10	4	3K
Agua Hedionda Lagoon	7	9	8	6	8	4	
Batiquitos Lagoon	43#	43#	45	40	45	52	
San Elijo Lagoon	15#	31#	20	30	60	70	2K
San Dieguito Lagoon	12#	45#	37	23	15	15	21K
Los Penasquitos Lagoon	12#	11#	12	5	5	21	2KB
Kendall-Frost Reserve	19	16#	8	23	33	30	3K
San Diego River	6#	6#	10	9	11	20	2KB
Paradise Creek Marsh	0	0	0	0	0	-	
Sweetwater Marsh	7#	4#	4	4	5	7	
E Street Marsh	1	1	1	1	1	1	
F Street Marsh	0	0	0	0	0	-	
J Street Marsh	1	1	1	1	1	2	
Otay River Mouth	1	1	1	1	1	0	
South Bay Marine Reserve	1	3	2	2	2	4	
Dairymart Ponds	-	0	-	0	-	-	
Tijuana Marsh NWR	113#	101#	105	75	98	127	20K
Total: pairs	441	520	525	528	633	656	
marshes	21	20	22	21	22	18	

- indicates that no census was taken.
* indicates a fall or winter occurrence.
# indicates the detection of unpaired rails (used beginning in 1987).
K = Kecking by advertising male; KB = keck-burr by advertising female.
a Paul Jorgensen Unpublished data; b 2 pairs are in Famosa Slough.

Four Principal Study Areas; Largest Subpopulations and/or Habitat Acreage

Upper Newport Bay

The 2016 Newport count was taken on 10 dates in February and March following four years of drought in what was predicted to be a wet year due to El Nino. The rails were responding to neighboring calls in enthusiastic fashion, yielding the third highest count ever tallied in a single wetland. High winter rail survival in recent years may be one positive effect of having no winter storm flows ripping through the marsh. Nest searching has been done after the call counts in order to re-verify the one to one relationship documented in the 1980s between calling and nesting; a pair's duet means there is, or shortly thereafter, will be a nesting attempt in close proximity. However, nest searching in Upper Newport Bay has been very unfruitful in recent years compared to earlier years. Four to six nests were found annually 2009 – 2013 with 60 field-hours or more of effort but few egg nests were discovered before hatching (none in 2013) and many had been depredated by raccoons, *Procyon lotor*. Raccoon sign is abundant throughout the marsh, apparently the result of rehabilitated animals having been released around the bay without permits. In 2014, we found a total of eight nesting sites on Upper Island in about 30 hours of searching over eight dates; 18 pairs of rails had vocalized from this same area earlier in the spring. The cordgrass on Upper Island was stunted; tall enough patches to support a rail nest have been scarce in recent years and in the lower reaches were reduced to barren mudflat in 2016. Even the bulrush cover was mediocre and late sprouting probably due to the lack of rain and runoff. With the threat of raccoon depredation, adequate nest cover in flotsam, wrack, or on high marsh berms, places that have been used in the past as nest cover, were not used in recent years. Below the old salt dike, nesting rails have been forced to the marsh edge. For example, the call count between the 23rd Street Drain and Delhi Channel yielded six pairs of rails calling from thick stands of quail bush, *Atriplex lentiformis,* on the marsh edge and two additional pairs calling from bulrush stands no larger than four square meters each.

The El Nino mass of warm water that pushed tides a foot or more higher than predicted in 2016, drowned lower marsh cordgrass stands that had been in place for many decades below the obstruction of the old salt dike across the bay. Berms that formed by sediments trapped in the once lush cordgrass lay barren during the 2016 rail nesting season. Lands that held rail nests just a few years ago were mudflats in 2016. The old salt levee however, appeared to be enough of a tidal obstruction that the cordgrass above it was far less affected and a nest search there yielded six nests along a 500 m belt, three hatched and three with eggs on 8 June.

With so little nesting activity on Upper Island we searched additional areas and found nest numbers closer to the expectations resulting from earlier call counts in those same areas particularly higher up the bay. Over three dates in May and early June 2015 we found 12 nests just below the old salt dike, four with eggs and four that had been predated. Nesting rails in Upper Newport Bay are being increasingly affected by tidal wash with limited alternatives because of predator abundance, particularly raccoons. Due to limited nesting habitat availability, we deployed 12 nesting rafts in Upper Newport Bay in 2016 but have had no nesting rails on them so far probably because of disturbance by raccoons. It is doubtful that rails have moved and packed in further up the bay to nest; it may be that some lower bay birds are not nesting. Predator management appears essential to the future well-being of the largest subpopulation in California.

Tijuana Marsh

Tijuana Marsh's subpopulation was 87 pairs for two consecutive years prior to the 2006 count of 102 breeding pairs, followed by the record count of 142 pairs in 2007. That 40-pair increase in 2007 was unprecedented in any marsh except Upper Newport Bay; the 95 pair crash in 2008 was totally unprecedented. This subpopulation had not been that small since 1991. LFRR numbers increased annually to more than 100 pairs by 2011 – 2013 and probably stayed near there since. The 2014 call count was shown to be low by comparing nest search results; calling was not great in 2015 either but good enough in 2016 to yield the second highest recorded total. The Tijuana Marsh subpopulation came back from a crash in 1985, suffering the effects of prolonged ocean inlet closure. Today, this is the second most secure and resilient subpopulation in California but still threatened by inlet closure which happened again in 2016. Unlike the earlier disaster, mechanical opening of the ocean inlet happened quickly. The mouth closed a few days before March 30th, went anoxic April 8 – 11th and was reopened. We examined a small piece of Oneonta Slough for rail nesting activity on 21 June and were pleased to discover 20 hatched nests and ample evidence of chick care. Call count results were comparable for that same area.

Observed differences between habitat conditions and nest placement in the Tijuana Marsh and Upper Newport Bay in recent years have been compelling. Most of the nests in Tijuana Marsh were in cordgrass but some also were in rank pickleweed, isolated out in the marsh with little indication of tidal over-wash. There was also little evidence of predation or raccoon presence and encounters with adult rails, adults displaying in defense of chicks, and adults with young of the year were very common in Tijuana Marsh but rare in lower Upper Newport Bay.

Seal Beach

The Seal Beach NWR subpopulation was 20 pairs or slightly more for most of the 2000s until 2011 and 2012 when 34 and 42 pairs bred there, respectively. The 2012 total was the highest since 1996 and the fifth highest count ever. The 2013 total was just two pairs short of the 2012 counts with 40 pairs tallied combining the nesting rafts and call count data. The 2014 total of 49 pairs was the new high count since 1996 and the 66 pairs documented in 2015 ties for the highest count on record, last observed back in 1994. The 60 pairs reported for 2016 is a mix of call count results and raft nesting data. Evening call count results have generally been poor and we have had to rely upon nesting data obtained through monthly visits to the nesting rafts, upon which most of this subpopulation nests. The 2016 call count was conducted on 9 March by 10 observers and 46 pairs and 20 males were in evidence. The rise in the Seal Beach subpopulation and probably Bolsa Chica as well, has been aided over the years with augmentation from the breeding program; a total of 72 rails have been released there, starting with six in 2002 and a total of 43 over five consecutive years, 2011 – 2015.

With ample habitat available to the rails on the Seal Beach NWR and strong monitoring and management programs in place, a large, resilient breeding population has been expected to develop. Raptor predation is suspected to be limiting rail survival in part because the marsh cover has been short; the cover, particularly of cordgrass has improved over time. Ongoing raptor monitoring has documented very high raptor numbers particularly in winter; seasonal high

tide counts of rails and raptors have also continued. A rail kill by a Red-tailed Hawk, *Buteo jamaicensis,* was observed in 2015; the Red-tailed Hawk was nesting on the edge of the NWR in a eucalyptus (*Eucalyptus* sp.) apparently left for such purpose. The most recently observed rail kill by a Northern Harrier (*Circus cyaneus*) in the NWR was in 2013, witnessed by Kirk Gilligan. Many more raptor kills than observed undoubtedly occur.

Seal Beach is one of few marshes currently occupied by LFRR that gets fully inundated during a high tide of about 6.7 ft (MLLW), or higher. Tides of this height occur regularly in the late summer, usually in darkness, and in the fall and winter in the early morning. The rails are forced onto debris or to the edge of the marsh where there is little cover and busy roads just beyond. This greatly exposes the rails to potential predation and vehicle collision. For example, a juvenile rail was found dead on the edge of Pacific Coast Highway (PCH) just off the NWR in September 2015 by Bob Schallman. However, the completeness of inundation also allows fairly dependable surveying of the subpopulation outside of the breeding season. Accordingly, the rails were counted again from canoes after the 2015 breeding season, but before the 2016 breeding season; the post-breeding high tide count will be done in early winter 2016. The pre-nesting high tide count of 144 rails in 2015 was the fourth highest on record (Table 2).

Since 120 paired rails and 20 males made it into the breeding season, at least 4 rails hid without being counted during the high tide survey. Potential rail predators were out in abundance during the winter count, hunting the marsh and edges, including Red-tailed Hawks, Northern Harriers, Peregrine Falcon (*Falco peregrinus*), Cooper's hawk (*Accipiter cooperi*), American kestrels (*Falco sparverius*), and Short-eared Owls (*Asio flammeus*). Continued upgrading and maintenance of the artificial rafts on the Seal Beach NWR is essential to the protection of the wintering rails and success of the breeding rails. More than half of the rails observed during winter high-tide counts are sequestered on the rafts.

Table 2. High Tide and Call Counts of Ridgway's Rails on the Seal Beach National Wildlife Refuge, 1975 - 2015.

Date	Tidal Height	Ridgway's Rails Counted	Breeding Pair Members Before	Breeding Pair Members After	Notes
2 Dec 1975	7.0	22	-	-	
31 Dec 1975	6.7	12	-	-	
21 Nov 1976	7.1	24	-	-	
20 Dec 1976	7.1	35	-	-	
21 Dec 1976	7.0	34	-	-	
10 Dec 1977	7.1	16	-	-	
11 Dec 1977	7.1	40	-	-	
18 Jun 1978	6.8	16	-	42	+6 youngsters
30 Nov 1978	6.7	38	-	42	
1 Dec 1978	6.7	32	-	42	
3 Sep 1979	6.4	20	42	60	Tide too low
3 Nov 1979	6.6	56	42	60	
2 Dec 1979	6.7	32	42	60	
3 Dec 1979	6.7	44	42	60	
21 Nov 1980	6.9	55	60	38	First red fox den found
29 Jun 1981	7.0	34	60	38	Tide too late, dark
12 Nov 1981	6.9	43	38	56	
29 Dec 1982	7.0	23	56	40	
18 Jan 1984	6.9	23	40	48	
21 Nov 1984	6.7	5	48	22	+ 7 red foxes
13 Nov 1985	7.1	2	22	10	+ 2 red foxes
12 Dec 1985	7.2	2	22	10	+ 2 red foxes
30 Dec 1986	7.2	7	10	14	Begin red fox trapping, 59 foxes removed in 1986
28 Jan 1987	7.0	7	10	14	63 red foxes removed in 1987
8 Aug 1987	7.3	8	14	14	Tide too late, dark
22 Nov 1987	6.7	12	14	28	
21 Dec 1987	7.0	8	14	28	+ 2 red foxes
16 Feb 1988	6.8	10	14	28	
22 Nov 1988	6.9	6	28	12	128 red foxes removed in '88
16 Oct 1989	6.9	59	12	32	Record High Tide Count; 25 red foxes removed in 1989
5 Oct 1990	6.4	57	32	56	Tide too low
2 Nov 1990	6.8	69	32	56	Record High Tide Count
22 Nov 1991	6.9	98	56	72	Highest Population Total
26 Oct 1992	6.8	159	72	130	Highest Population Total
15 Oct 1993	6.8	143	130	132	Highest Population Total Ever
4 Nov 1994	7.0	150	132	102	220 Red-tailed Hawks counted On the NWS on 11 December 1994
25 Oct 1995	6.5	53	102	104	Tide too low
22 Nov 1995	6.9	55	102	104	
10 Dec 1996	6.7	55	104	74	
17 Oct 1997	6.6	40	74	32	
04 Nov 1998	6.8	30	32	30	

Table 2 (continued). High Tide and Call Counts of Ridgway's Rails on the Seal Beach National Wildlife Refuge, 1975 - 2015.

Date	Tidal Height	Ridgway's Rails Counted	Breeding Pair Members Before	Breeding Pair Members After	Notes
23 Nov 1999	7.0	17	30	20	
11 Dec 2000	6.9	30	20	22	
15 Nov 2001	6.7	35	22	48	
04 Dec 2002	7.1	62	48	46	
26 Oct 2003	6.7	96	46	32	
12 Nov 2004	6.7	52	32	30	
15 Nov 2005	6.7	57	30	42	
09 Oct 2006	6.6	103	42	48	
06 Nov 2006	7.0	95	42	48	
26 Oct 2007	7.1	32	48	34	
12 Nov 2008	6.9	20	34	38	
01 Dec 2009	6.8	50	38	50	
05 Nov 2010	7.0	51	50	68	
26 Oct 2011	6.9	96	68	84	
14 Nov 2012	7.1	145	84	80	
04 Nov 2013	6.7	121	80	98	
07 Nov 2014	6.8	102	98	132	
25 Nov 2015	6.8	144	132	120	

Point Mugu

Since doubling in size between 2001 and 2003, the Point Mugu subpopulation fluctuated between 14 and 19 pairs, from 2003 - 2007. It had been much smaller, 3 - 7 pairs for nearly 20 years until augmentations with captive-bred rails fostered its growth. There was a crash in 2008 back to 5 pairs, but the subpopulation was back up to 9 pairs in 2009, 12 pairs in 2010, a minimum of 16 pairs in 2011, 22 pairs in 2012, an all-time high of 23 pairs in 2013, at least 16 pairs in 2014, 12 pairs in 2015, and back to 16 pairs in 2016. There is an efficient predator management program in place, consistent rail and marsh management, but issues, perhaps mostly raptor predation, prevent this subpopulation from exploding into full occupation of the largest contiguous patch of potential habitat in southern California. There was no activity detected in the eastern arm/central lagoon and only one pair attempted to breed in freshwater marsh vegetation on the west side along Perimeter Road. Raptor depredation appears to have been a long standing issue in Point Mugu. Consequently, the rails depend upon the heavy cover provided by spiny rush but many of the spiny rush stands are greatly degraded by competing vegetation that should be weeded out of these stands. In addition, the freshwater marsh dewaters in dry years and could be kept viable through the entire breeding season with flood irrigation, if possible. A couple of the nesting rafts are being used consistently and two *Spartina* sp. nests were found in the marsh for the first time.

There were regular re-sightings of banded rails at Point Mugu up until 2008 when captive-bred rails were no longer released there. Although some of the captive-bred rails appeared to have stayed in Point Mugu, some definitely left after release. For example, a female banded 1035-8878, was photographed in Upper Newport Bay on December 12, 2004 by Steve Metz. This

female was bred at the Chula Vista Nature Center and released into the eastern arm of Point Mugu on August 28, 2004, 106 days before her picture was taken at Newport. This shattered the old long-distance movement of 13.5 miles recorded for the subspecies *levipes* (Zembal et al. 1983). The distance from Point Mugu to Upper Newport Bay is approximately 90 miles along the coast. The long distance record, 160 miles was traveled by a female banded 1065-39863 ("Amelia"), released at Point Mugu August 25, 2009 and recaptured November 4, 2010 at the Chula Vista Nature Center (now Living Coast Discovery Center). Amelia had returned to the facility where she was hatched and reared.

Sixteen Additional Study Areas, North to South

Carpinteria Marsh

The last known LFRR call from Carpinteria Marsh was from an unmated female vocalizing constantly with no answering call in 2003. In 2004, there was total silence until April 13, when two males were released in the hope that the female was still alive. Occasional reports of LFRR vocalizations have been investigated in 2005 through 2016 but could not be corroborated. This northern wetland is plagued with domestic cats in the marsh and other predators of concern, most notably red fox. At least one red fox den location is still located on the very edge of the marsh. Without consistent predator management, the chances for the reoccurrence of a viable subpopulation in Carpinteria Marsh are poor.

Ballona Wetlands

The historic wetland area is bisected by Ballona Creek and totals about 600 acres; only a small portion of that area is tidally influenced today. A LFRR was photographed in the tidal marsh by Rachel Woodfield in 2008 but further investigation of that incident led to no additional encounters. Vocalizing rails were reported in 2015 and 2016 in the privately-owned freshwater marsh near the corner of Jefferson and PCH. The call was that of an advertising female, perhaps the same individual for two years now. Attempts to observe her for bands were unsuccessful. Because the marsh awaits a big "restoration" project, there will be no additional rails officially moved into Ballona in the immediate future.

Bolsa Chica

Attempts to elicit responses to a tape-playback of a duet were unsuccessful at Bolsa Chica in 2011 and 2012, when only males were detected. However, LFRR breeding behavior was observed in 2010, 2013, 2014, and particularly 2015 and 2016 when record counts of seven and nine pairs, respectively, were documented. The rails adjacent to the boardwalk and along the trail were extremely visible throughout the season. The CDFW Reserve Manager Kelly O'Reilly forwarded multiple photos of the adults and young. The highly visible and often photographed rails of Bolsa Chica in 2015-2016 have been the best known ambassadors for endangered species that have ever emerged in Orange County. There were four pairs of rails near the boardwalk; one to the north in the big patch of marsh around the first trail bend; and four to the south along the dune edge. Seven of nine territories abut the dune along PCH. The habitat is close enough to PCH, to be of major concern for collision hazard with vehicles (see 2015 recovery of a dead rail from PCH at Seal Beach NWR). The near constant noise masks predator cues and the fast moving vehicles would dispatch any rail that flushed that way. Recent reports of rails vocalizing

from south Bolsa Chica below the bluffs in the freshwater reed stands again could not be corroborated.

Huntington Beach Wetlands

One of the highlights of the 2006 survey of LFRR was the discovery of yet another breeding location in the Santa Ana River Marsh, also previously known as Newport Slough and listed in Table 1 under the Huntington Beach Wetlands (HBW). Four pairs were detected there in 2006 and 2007, up to six pairs in 2010 – 2012, a record nine pairs in 2014 (again including one pair in the Brookhurst Marsh), and the new high of 12 pairs in 2015 and 2016. The Santa Ana Marsh is at the southern terminus of the Huntington Beach Wetland Complex, comprised of several wetland patches strung along the coast totaling more than 200 acres. The 92-acre Santa Ana Marsh was restored as part of the Federal Flood Control Project on the Santa Ana River. Dampened tidal influence was re-established and cordgrass was planted primarily along a narrow eastern portion of the marsh that lies between an oil field and the south dike of the river. This cordgrass marsh is extremely well-developed and patches have grown into the main marsh as well. Although the main marsh area is heavily impacted by human residents and their dogs from just across the main channel, one of the detected pairs called from the largest patch of cordgrass in the center of the main marsh.

Restoration of the HBW is continuing and one of the pairs counted in the tally for this marsh complex was actually in the Brookhurst Marsh in 2010. Lena Hyashi reported a pair on April 19, 2010 vocalizing and observed along the larger stand of spiny rush near the dunes and PCH. This was the first record for LFRRs potentially breeding in the HBW Complex outside the Santa Ana River Marsh since the 1970s. Unfortunately, late in the 2010 season and in 2011 we were only able to elicit "kecking" from a male, so breeding was not confirmed. However, a pair was back again in the Brookhurst Marsh in 2012 – 2016 with a second pair in the Talbert Marsh in 2015.

San Joaquin Reserve

LFRR vocalizations were reported for the San Joaquin Reserve in 2010 - 2016. Nancy Kenyon reported and Jeff Bray photographed an adult there on 30 March 2015. The calling reported in the Reserve was likely an unmated male in 2010 but in 2011 breeding was documented by Barry Nerhus. A 9-egg nest was found in the southwest corner of cell 6 in bulrush in April; it subsequently hatched and chicks were observed. At least two pairs bred in the Reserve in 2011 and 2013 along with advertising males; one pair was detected in 2012; a pair and advertising female were detected in 2014; a pair and at least one male were detected in 2015; but only a kecking male was heard in 2016. With increased management for edge foraging habitat, this extensive freshwater marsh system has good future potential for rails, marauding raccoons notwithstanding.

Santa Margarita River

The salt marsh at the mouth of the Santa Margarita River typically held a single pair of nesting rails for many years and occasionally there have been two pairs. These pairs are invariably in the same spots from year to year; at the river mouth in freshwater marsh in the Sweetwater Marsh section of the estuary and/or between Stuart Mesa Road and the railroad tracks on the north side

of the river in the freshwater marsh that rims a pond. Unusually, in 2008 a single pair was located on the channel surrounding the least tern island at the junction of the inlet channel. We did not gain access to do surveys in 2009 or 2010 but did a base-wide survey of the potential habitat on base in 2011. Once again, John Konecny found two nesting pairs in the Sweetwater Marsh section of the river mouth and nothing in the many little pocket wetlands scattered along the Pendleton coast. The Sweetwater Marsh Complex was checked once by Barry Nerhus in 2012 with negative results. Tom Ryan checked the Pendleton coast in 2013 and reported three points of calling to the state. Two points were south of the river along the little channels in the vicinity of the tern island and were described as a "purr" which must mean two advertising females; the third rail apparently uttered a single clappering at the mouth of San Onofre Creek. Access was again not gained in 2014 or 2016. In 2015, Tom Ryan reported two points of calling from the usual places and John Konecny's assistant found a pair inland of the 5 freeway.

San Luis Rey River

Historic detections of LFRRs on the San Luis Rey River have been rare and mostly confined to the freshwater marsh at the river mouth in Oceanside. Past reports of inland sightings could not be corroborated until recently when John Konecny found two pairs defending inland freshwater marsh habitat in 2010, three pairs in 2011 and 2012 (Richard Zembal), four pairs in 2013, a record five pairs and a male in 2014, and three pairs in 2015. The freshwater marsh is being invaded by willows and will probably not survive many more years unless the hydrology changes with higher flows. Unfortunately, in 2016 the river was dry and no habitat for rails survived the drought.

Buena Vista Lagoon

As in San Dieguito, rail numbers in the freshwater marsh habitat of Buena Vista Lagoon have fluctuated widely over the years. The past high count was nine pairs in 2008, 2009, and 2012 but only two pairs in 2013, four pairs in 2014, a new high of 10 pairs in 2015, down to four pairs again in 2016. One pair was detected in the western lagoon between the railroad tracks and the coast route; two pairs were detected in the big central lagoon east of the Nature Center; and one pair was in the eastern lagoon. Although the creek held a pair last year and was checked three times, there were no detections there in 2016. The habitat on the creek comes and goes with flood control maintenance and high winter flows. Half of it had been mowed, apparently just after last year's detection. There had been a four-acre fire in the marsh adjacent to the interpretive center in 2013 but the vegetation recovered; the entire wetland abounds with extremely abundant raccoon sign. The many management issues at this little marsh are shared with most of the other coastal wetlands including abundant non-native trees and shrubs that harbor perching predators and homeless people. The reed beds have become extremely thick and there is little remaining side story of native marsh halophytes to support foraging rails. In order to potentially bolster the subpopulation in this freshwater system, there was a release of 15 rails bred in zoological facilities on July 19, 2011 into the central lagoon. The CDFW allowed a release of three additional rails carrying telemetry backpacks on July 6, 2016.

Agua Hedionda Lagoon

The marsh at Agua Hedionda Lagoon previously held a maximum of seven pairs in 1983 followed by a development project that greatly affected the drainage that used to support the brackish marsh and rails were barely detected in the 1990s. The numbers built slowly but fluctuated widely to a former high again of seven pairs in 2006, 2008, and 2011. The count hit the all-time high of nine pairs in 2012 and was just under that in 2013 and 2015 with eight pairs but in 2016 plummeted to only four pairs. With the recently increased street runoff from adjacent housing, the main freshwater marsh has rejuvenated to some extent, perhaps to the benefit of the rails as evidenced by the record number in 2012. More recently, the drought has taken a toll on the habitat. The salt marsh on the eastern rim of the inner lagoon has developed some nice cordgrass stands from which four of the rail pairs were calling in 2015 and one in 2016. Unfortunately, two of the regularly inhabited marsh patches are being regularly impacted by paddle boarders, beach goers, and their dogs accessing the marsh off the sand spit at Bayshore Drive. This subpopulation was augmented with the release of five rails from the breeding program in 2004, six in 2011, 16 in 2012, and nine in 2013.

Batiquitos Lagoon

The rails increased gradually in Batiquitos Lagoon as the wetland habitat continued to improve over time following the major restoration project implemented there by December 1996. The lagoon has remained mostly tidal and rail habitat has been generally increasing and improving. Breeding rails were detected on the north side of the lagoon for the first time in 2004 and a total of 11 pairs was detected. LFRR numbers grew to 22 pairs in 2007 and 2008 and Batiquitos Lagoon was the third largest subpopulation in the state 2008 - 2010. New annual high counts continued into 2011 and 2012 with 43 pairs detected each year, a new high of 45 pairs was documented in 2013 and 2015, and the new record of 52 pairs was set in 2016.

We covered this marsh over multiple visits, usually with two observers using duet playback. The use of multiple observers on a single count was attempted in 2013, mostly without playback and few pairs were documented. The multiple-observer approach to surveying is very dependent on conditions on the day of the survey and the results might be greatly enhanced with playback. In 2016, there were nine breeding pairs vocalizing from habitat adjacent to and south of the western tern island; 20 pairs along the north edge of the inner lagoon; 21 pairs along the southern edge but with no advertising females this year or last; a pair in the northeast corner of the middle basin just west of the freeway in the extensive reed stand there; and a pair on the creek off Levante and El Camino Real in the freshwater reeds on the creek. The cordgrass in the west basin is extensive and looks vigorous, although most of it is too submerged during higher tides to provide adequate nest cover. Batiquitos Lagoon received rails bred in the zoological facilities in 2004 and 2005 (8 rails each year), again in 2013 (6 rails), 2014 (12 rails), and 2015 (7 rails).

San Elijo Lagoon

The San Elijo Lagoon subpopulation was back up to its former record high level of 15 nesting pairs in 2010 and 2011; the former high was more than doubled in 2012 with the detection of 31 breeding pairs; was down to 20 pairs in 2013; back up to one pair shy of the record high in 2014 with 30 pairs; doubled to 60 pairs in 2015; and then 70 pairs in 2016, the record high count for

this wetland and third largest subpopulation in California. San Elijo Lagoon has had major efforts to maintain tidal function and suitable rail habitat in the central lagoon has expanded greatly; the cordgrass there is as lush as can be found anywhere in the California range of this rail. However, the lagoon does still close off to the ocean regularly resulting in poor hydrologic conditions for variable periods of time. The area inland of the weir becomes a lake during high rainfall years. Of the total, 27 pairs were in the east basin with a male with no clear detections along the creek; 35 pairs were in the central basin, mostly in great cordgrass; and eight pairs were in the west basin, also mostly in lush cordgrass. San Elijo received an augmentation of eight rails bred in zoological facilities in 2004, five in 2006, four in 2007, 16 in 2009, and seven in 2012 mostly at the weir in the inner lagoon. One of the 2004 rails was re-sighted near the railroad tracks in the central lagoon on December 13, 2004, six months following release, and one of the 2006 rails was observed repeatedly over six months off of the Rios Avenue trail. However, there have been no reported re-sightings of live banded rails since then. A dead rail was retrieved from San Elijo in May of 2010 that was banded and released into San Elijo on June 16, 2009.

San Dieguito River Valley

The subpopulation of LFRR discovered in the San Dieguito River Valley in 2004, inland of the lagoon and El Camino Real, was first reported at six breeding pairs and then conservatively, at 12 pairs in 2005. In 2006, there was abundant calling indicative of at least 31 breeding pairs ranking this as the third largest subpopulation that year and the largest ever reported in a freshwater marsh system. This freshwater marsh fared better than the tidal marshes in the crash year of 2008 and reached its height in 2012 at 45 pairs. The 2015 and 2016 counts of 15 pairs each were partial counts because the golf course on the south side would not allow access. However, doing playback along the south side generally adds only about 5 pairs. The surveys here are generally high one year and low the next and counts invariably include a lot of advertising males, particularly in low pair count years. In 2011, for example, there were 12 pairs and 33 advertising males. Such an abundance of unmated males is indicative of female-skewed predation, probably suffered during egg depredation. These widely fluctuating annual totals and abundance of males indicate a general lack of stability, probably due to extreme vulnerability to predators in this type of wetland; raccoon sign is very abundant along the marsh. Usually, at least one pair is detected in habitat on pond edges in the golf course; perhaps a disincentive for allowing the survey. Additional rail detections are still being reported from the San Dieguito Creek Watershed but have yet to be corroborated since they would not respond to callback. Reported locations have included Lusardi Creek, the pond at 4S Ranch Community Park on Dove Creek Road, and at 4 Gee Road just north of Camino Del Sur.

The freshwater marsh system in San Dieguito Creek above El Camino Real is enigmatic in the broad swings in rail abundance. However, it is paramount to maintain this important freshwater marsh system for the rails. When the largest rail subpopulations crashed in 2008, the one in San Dieguito went up 40%. The current hydrologic regime provides the conditions sustaining this one-of-a-kind wetland; the current hydrology needs to be understood and maintained. The invasion of non-native plants should be managed; the marsh is succeeding slowly to a woodland. The most pervasive invader is *Tamarix* sp., occurring along with pampas grass (*Cortaderia* sp.), eucalyptus, palms (mostly *Washintonia* sp.), and more limited giant reed (*Arundo donax*), and

castor bean (*Ricinus communis*). The tamarisk in particular provides cover, shelter, and perch sites for raccoons; it needs to be removed. The restoration area between El Camino Real and the freeway has developed good cordgrass cover that appears of suitable quality for rails and finally in 2016, one of the reported pairs was calling from the cordgrass off San Andres Drive.

Los Penasquitos Marsh

Los Penasquitos Marsh is dominated by vegetation indicative of prolonged closure to the ocean, particularly pickleweed. However, freshwater influence and freshwater marsh edge are increasing and the rails currently appear to be using mostly the freshwater marsh habitat. The detection of 12 pairs was a record high for this wetland in 2007. The number plummeted to only two pairs in 2008; built back gradually to 12 pairs by 2011 and 2013 (four of which were on the creek above the lagoon in both years); decreased in 2014 and 2015 to just five pairs including one on the creek in both years; and exploded to 21 pairs in 2016 including 10 pairs on the creek. In most years but particularly wet ones like 2011, the lagoon fills with runoff and much of the marsh remains inundated until late spring. Under these conditions, the rails do not call much and are difficult to detect until the marsh drains, later in the season; the conditions are too lake-like for breeding and foraging for a good part of the spring and early summer. With the prolonged drought over recent years, an additional problem has been extreme dryness in most areas untouched by the tides. In 2016 there was heavy inundation of the marsh caused by railroad bridge repair work. Four rails bred at the zoological facilities were released into Los Penasquitos in 2004, four more in 2007, and nine in 2009. Again, population augmentation has been curtailed for fear of interference with pending marsh restoration plans. There was a re-sighting of a banded female hatched at the Wild Animal Park and released in 2007 at Los Penasquitos. She was photographed with her mate and three downy chicks on the edge of the pond below the San Diego Water Utilities Pump Station on Sorrento Valley Road on July 10, 2009 by Eric Kallen.

Kendall-Frost

The annual subpopulation total in the University of California Reserve at Kendall-Frost has fluctuated widely. The rails struggled there in the 1990s with a high of 11 pairs in 1992 and mostly two to five pairs annually. In the early 2000s this subpopulation hit a low of two pairs in 2008, following two years of 14 pairs in 2004 and 2005. The former high count was 24 pairs in 1984, a count nearly reclaimed in 2014 with 23 pairs but also with 16 males advertising. In 2015, a new all-time high of 33 pairs was recorded and nearly maintained with 30 pairs in 2016. This is as densely packed as rails get in a southern California wetland. This marsh is small, very isolated, and bordered by urban housing, but it is also well managed under the University of California Reserve System. The stewardship includes appropriate predator management, habitat restoration, and research management to assure minimal human disturbance to the rails and their habitat. Additionally, nesting rafts have been provided (21 rafts in 2016) and are used heavily by the rails there since 1987. There have also been translocations of eggs and adults bred in zoological facilities (five rails in 2003, seven in 2009, and 14 rails were released there in 2013). Additional monitoring of this remnant Mission Bay wetland is planned using winter high tide counts with the aid of the San Diego Audubon Society. A count conducted from kayaks on December 4, 2013 revealed 28 LFRRs, at least two of which were banded, undoubtedly in 2013; a banded rail was observed during high tide in December 2015; and banded rails were seen with chicks in 2014.

San Diego River

Cordgrass continues to dominate a significant portion of the western end of the San Diego River at the bay and a high count of eight pairs of breeding LFRR were there in 2004. The numbers varied since then with seven breeding pairs detected in 2010; six pairs in 2011 and 2012; a record 10 pairs in 2013; nine pairs in 2014; a new record of 11 pairs in 2015; and an all-time high of 20 pairs in 2016. One to two of these breeding pairs (only a female in 2016) continue to be detected in little Famosa Slough most years, south of the 8 Freeway; one of the adults seen with chicks in 2015 was banded, reported by Jim Peugh. One of the pairs detected in 2010 was well west of the others, close to the ocean at the dog park. A previously unknown population of salt marsh bird's beak, *Cordylanthus maritimus maritimus*, was also discovered there in 2010 just off one of the foot trails. There were several hundred plants but unfortunately they are being smothered out by the clumped invasive Algerian sea lavender, *Limonium ramosissimum*. LFRR bred in the zoological facilities have been released in the cordgrass marsh to potentially spawn a larger, more viable subpopulation. Five rails were released in each of three years, 2005, 2007, and 2010; 11 rails were released in 2011 including five females; and nine more were released in 2012. One of these more recently released rails was likely the banded rail observed with chicks in Famosa Slough.

The habitat in the river west of the 5 Freeway appears quite suited for rails but management may be required to reach full potential. There are large rat and ground squirrel populations inhabiting the riprap along the channel, a known drop and feeding station for bolstering the tortured lives of feral domestic cats, and a large raccoon population. A great restoration project there would involve filling the riprap with soil and planting pickleweed and other upper marsh species; this would limit habitat suitability for egg-eating rats and expand native salt marsh for Belding's Savannah sparrows (*Passerculus sandwichensis beldingi*). Also, the river is operated in part for flood control and regular high flows in wet years could greatly affect the rails therein; having high marsh habitat on the upper edges of the channel could be very beneficial.

Sweetwater Marsh

None of the breeding pairs of LFRRs reported for the Sweetwater Marsh NWR were inland along the Sweetwater River in 2013, 2015, or 2016. They had been detected annually for many years along the river above 2nd Street and a single pair was there again in 2014. In 2016, there was one pair in the main marsh near the bay; five pairs in Vener Pond marsh; a pair below the rail enclosure near the pond; and a pair in the E Street Marsh parcel. There were nests on 10 rafts in 2016 with signs of at least partial hatches or brood use as of mid-June in at least five of those, plus a successful nest in *Spartina* sp. The Sweetwater Marsh Complex is endowed with a thriving raptor population, fully in evidence on every visit with ample good hunting perches spaced regularly along the marsh edge. The marsh growth is low and the rails are quite vulnerable. Four captive-bred LFRRs were released into Sweetwater in 2002, 11 in 2005, six in 2008, 14 in 2010, three in 2011, nine in 2012 (eight of nine in Paradise Marsh), and one in 2015 but none have been re-sighted.

J Street Marsh

The J Street Marsh parcel is the marsh just north of the former power plant site and South Bay Salt Works, dominated by cordgrass, and probably has regular presence by LFRRs but is difficult to access and survey. Single pairs were detected annually in 2011 - 2015 and two pairs were there in 2016 next to the small park at the north terminus of the marsh. This little wetland currently sports some of the most vigorous cordgrass growth in the south bay and should be a focus site for future management.

Otay River

The Otay River is channelized, typically 100 ft wide or less where it runs under the 5 Freeway, coursing northwest for about 3,200 ft to the Salt Works. Most of the vegetation along this stretch is dominated by cattails with willow over-story near the freeway. The channel continues another 10,200 ft until it opens to south San Diego Bay. This latter, longer stretch is dominated by upper salt marsh plants. Single pairs of rails were detected in 2011, 2012, 2014, 2015, and in many previous years calling from the vicinity of the bike trail overcrossing of the channel just south of the Salt Works. No presence was detectable there in 2013 or 2016 but a single clappering and a male were heard on Otay Lake on a north finger near Route 9 and Otay Lake Road in 2013 and the Otay system has undoubtedly retained minor rail presence somewhere along its course. The lake is lined with a narrow fringe of reeds that may harbor more rails than detected but the habitat is narrow and marginal. Reports of rails have been annual in recent years on a developing marsh portion of the river where it flows into the Salt Works; the area is most easily accessible by kayak. A juvenile was reported from the newly-restored western ponds in south San Diego Bay by Robert Patton on June 17, 2015. This older chick was still darkly-colored and so hatched very nearby.

South Bay Marine Reserve

An adult LFRR and a chick were observed in the South Bay Marine Reserve in 2005 after the survey report had already been finalized. There have been one to three pairs detected annually 2005 – 2016, except in the 2008 crash; two pairs have been reported for the past three years and in 2016, there were four pairs. This small isolated marsh is not so isolated anymore with the restoration of the two ponds to the south where a young rail was observed in 2015 and a pair was vocalizing in 2016 (that pair is included in the Marine Reserve total).

Sex Ratio

Nine of the 20 marshes with vocal rails in 2016 were male-skewed and three were female-skewed. Minimum totals of 85 unmated males and five females were heard during the call counts including: 20 single males on the Seal Beach NWR; 13 males in Upper Newport Bay; 21males in the San Dieguito River Valley; and 20 males in Tijuana Marsh (see Table 1 for all records). The marshes at Ballona Wetlands, Los Penasquitos, and the San Diego River held advertising females. The usual condition has been a slight of males during most years and in most marshes. An extreme male skew or even a slight female skew could indicate major issues, unfortunately of an unknown nature but probably involving heavy depredation. The ratio of males to pairs is of concern in the San Dieguito freshwater marsh, for example.

Additional Rail Sightings

The continued annual release of captive-bred LFRR is co-occurring with increased detections of rails in new locations, particularly inland sites on creeks, rivers, and lake edges. Some of the recent detections of interest are as follows. There have been repeated sightings on the edge of Point Mugu at Ormond Beach since 2009. Sue Hoffman flushed a single LFRR adjacent to the mouth of the Santa Ana River in the plover yard at the Huntington State Beach California Least Tern nesting colony in 2008; a dead rail was reported between PCH and the Tern colony in July 2009. A rail was reported from the lake at Laguna Niguel in 2011. LFRRs are still reportedly vocalizing in the reeds at Kumeyaay Lake on the San Diego River including at least one advertising female in 2011. LFRRs are reported annually in the San Dieguito River Watershed well inland of the Polo Club. Paul Lehman and others reported seeing a LFRR at the northern end of Upper Otay Lake on April 20, 2009 and there have been reports there almost annually. Phil Unitt reported a dead rail retrieved on July 15, 2015 from the south side of a large building at 9791 Towne Center Drive near Los Penasquitos Lagoon. Finally, Bob Schallman recovered a dead rail from the edge of PCH near the Seal Beach NWR in September 2015.

Conclusion

The LFRR population in California increased annually beginning in 2001, coincidental with the first release of captive-bred rails into the wild, to a high count of 443 pairs in 2007 followed by the crash of 2008. The state population recovered from the crash with a 37% increase in 2009, growing annually thereafter to within two pairs of the 2007 record by 2011. In 2012, it reached a new high, for the first time exceeding 500 pairs statewide and has maintained 500+ breeding pairs annually for five consecutive years, exceeding 600 pairs for the first time in 2015 and 650 pairs in 2016. However, many of the extant LFRR subpopulations today remain too small for long-term viability; 10 of 18 subpopulations were 16 pairs or fewer in 2016. On the other hand, two subpopulations exceed 100 pairs, one of those has exceeded 200 pairs for three years; three subpopulations are greater than 50 pairs each; and several subpopulations are either expanding, holding, or fluctuating but at relatively high totals compared to the past, particularly in the Seal Beach NWR and Kendall-Frost Reserve. Additionally, there is greater evidence than ever before of movement between marshes. The future outlook for the Light-footed Ridgway's Rail is stronger now than it has been in decades.

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